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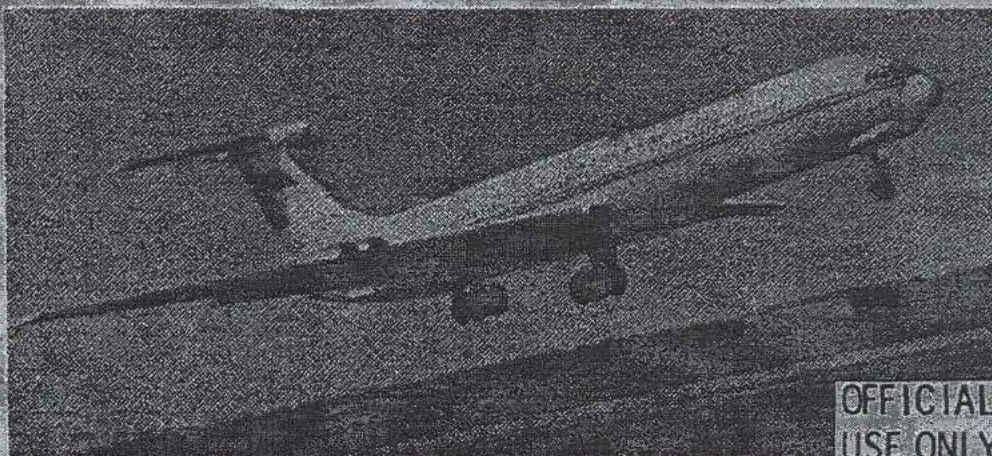
NORTH AMERICAN AIR DEFENSE COMMAND

Weekly Intelligence Review (U)

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Issue No. 17/64, 24 April 1964

The WIR in Brief

Portion identified
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to the appeal

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Space

KY COSMOS LAUNCH, POSSIBLY OF A NEW OR
MODIFIED VEHICLE, FAILS

Second KY inflight failure in month.

X-RAY PHOTOS OF SUN TAKEN ABOVE EARTH'S
ATMOSPHERE ABOARD SOVIET ROCKET

Rocket reached altitude of 500 km.

SOVIET EARTH SATELLITES LISTED: OVER-ALL
SATELLITE SITUATION PRESENTED

As of 20 April.

CONTINUED RECEPTION OF SIGNALS FROM
PROBABLE VENUS PROBE REPORTED

Pravda reports location of Zond 1.

AREAS OF POSSIBLE PHOTORECONNAISSANCE
BY 'COSMOS 20' SHOWN

See map on page 32.

2 OR MORE SMALL CHANGES IN ORBITAL
PLANE THEORIZED FOR POLYOT 2

Differences in orbital inclination of
payload and fragment noted.

Portion identified
as non-responsive
to the appeal

COVER: CLASSIC/IL-62 transport.
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NOTE: Pages 24, 26, 27, 30, 31, 34, and
35 of this issue are blank.

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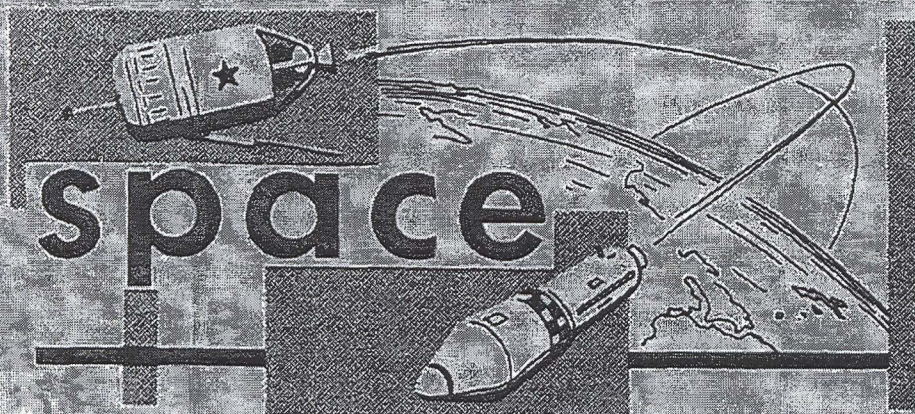
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significant
intelligence
on space
developments
and trends

KY Cosmos Launch, Possibly of a New or Modified Vehicle, Fails

The Soviets failed in an attempt to launch a satellite from the Kapustin Yar (KY) Missile Test Range at about 0841Z, 8 April. Preliminary analysis indicates that the vehicle impacted about 440 n. m. downrange.

This is the second inflight failure of a KY launch within a month, the first occurring 14 March. Cosmos-type satellite vehicles were probably involved in both launch attempts. KY launches previously have exhibited good reliability. Two failures within a month suggest that a new or modified launch vehicle may be under test at Kapustin Yar.

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X-Ray Photos of Sun Taken Above Earth's Atmosphere Aboard Soviet Rocket

The Soviets have taken "photographs" of the Sun, using the Sun's X-radiation to register on the film instead of visible light rays, according to the Soviet news agency TASS. The photography was accomplished above the Earth's atmosphere, which screens out X-rays from celestial sources, by equipment carried aloft by a vertically fired rocket.

The disc of the sun is almost black in the photography (that is, non-emitting) with 3 bright areas standing out in the background. A comparison with photography taken from the ground, in which visible light registered on the film, indicates that these spots are located in the upper layers of the solar "atmosphere" which lie above the active regions of the visible disc.

The X-ray photography was accomplished by means of a special automatic device carried aloft by a rocket, according to TASS. Instead of lenses, the space "camera" -- a metal cylinder -- had 12 apertures covered by thin films of aluminum and polymers. The hatch of the compartment which contained the camera was opened automatically at an altitude of 170

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kilometers (91 n.m.). The rocket reached an altitude of 500 kilometers (270 n.m.) before it began to descend. The camera hatch was closed 570 seconds later, as the rocket was entering the dense layers of the Earth's atmosphere. The camera was landed by parachute.

Similar work, using X-ray spectrometers, has been conducted in the US for some years.

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Soviet Earth Satellites Listed; Over-all Satellite Situation Reported

Soviet vehicles orbiting the Earth as of 20 April 1964 are listed on page 33, together with their life expectancies and certain other information.

The over-all space vehicle situation as of the same date was as follows:

	<u>US</u>	<u>UK</u>	<u>Can</u>	<u>USSR</u>	<u>Total</u>
Payloads in Earth orbit	84	2	1	8	95
Payloads in Sun orbit	5			4	9
Payloads in Earth-Moon orbit				1	1
Payloads resting on the Moon	2			1	3
Pieces of debris in Earth orbit	308		2	14	324
Pieces of debris in Sun orbit	4				4
Total objects in space	403	2	3	28	436
Objects decayed or de-orbited	183			170	353

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Continued Reception of Signals From Probable Venus Probe Reported

Pravda reports that 25 radio sessions were held with the Soviet space probe Zond 1 during the period 2-15 April 1964, using an RF of 922.76 mc/s, and that the data received indicates that the probe is functioning according to program.

The probe was 4,250,000 kilometers (2,280,000 n.m.) from the Earth at 1800 hours, Moscow time, 15 April, according to Pravda. Its coordinates in the celestial sphere were:

Right ascension	5 hours, 56 minutes
Inclination to ecliptic	minus 5 degrees, 16 minutes

In this connection, the WIR previously reported that Zond 1's inclination to the ecliptic as of 1800 hours, Moscow time, 4 April, was 4 degrees.



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22 minutes; this should have read minus 4 degrees, 22 minutes.

Zond 1 is believed to be an attempted Venus probe, although the Soviets have not acknowledged this. The propulsion and electronic configurations of the vehicle were compatible with a Venus probe, launch occurred at a time close to optimum for such a probe, and the vehicle appears to be heading in the general direction of that planet. Western sensors have not intercepted any signals from the probe since 4 April.

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Areas of Possible Photoreconnaissance by Cosmos 20 Shown

The map on page 32 shows many of the areas of the world over which Cosmos 20 passed during its 8 days in orbit. The heavy lines indicate the areas over which payload activity apparently occurred, [REDACTED]

[REDACTED] The possibility and probability that this payload activity was associated with photoreconnaissance, with film recovered on de-orbit of the vehicle, were discussed in last week's WIR (pp. 6-8).

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2 or More Small Changes in Orbital Plane Theorized for Polyot 2

The Soviet story of Polyot 2 is that this space vehicle, which was launched 12 April 1964, made several major inflight changes in orbital parameters which resulted in a considerable modification of orbital plane. NORAD believes that this story is exaggerated. Nevertheless, there are some peculiarities in the orbital parameters of Polyot 2 and a plate-shaped fragment which lead to a theory that this vehicle may have executed two or more small changes in orbital plane.

Polyot 2, when it passed through the beams of Shemya radar on its Zero (initial) Orbit, had an inclination to the Equator of about 59 degrees. When next observed, its inclination was 58.1 degrees, while the plate-shaped fragment had an inclination of nearly 60 degrees. From this data it seems possible that, sometime after passing Shemya on Zero Orbit, Polyot 2 may have made a change in orbital plane of about 1 degree, that is, from 59 degrees to nearly 60 degrees (the orbital plane of the fragment), and then made a second change of about 2 degrees, that is, from nearly 60 degrees to the present orbital inclination of about 58 degrees. The platelike fragment may have become detached from the payload sometime between the end of the first orbital change and the beginning of the second one.

These two maneuvers, if they did occur, appear to have been executed during Zero Orbit sometime prior to Polyot 2's descending cross-over of



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the Equator, southwest of Hawaii. This tentative conclusion is based on back-tracking of SPADATS data. It may be significant, in this connection, that two Soviet missile-range instrumentation ships in the Pacific were then close to the Earth trace -- well within "beacon range" -- of Polyot 2 and thus could have tracked the vehicle during any maneuvers that it may have executed at the time.

Polyot 2, assuming that it weighed 10,000 pounds, could have accomplished these maneuvers with about 1100 pounds of propellant having a specific impulse of 300 seconds. This lies within Polyot 2's estimated capabilities.

It is not possible to verify this theory, owing to a lack of evidence. For example, the track of the small plate-like fragment during Zero Orbit cannot be isolated and defined, since Shemya detected multiple objects in association with Polyot 2 during that orbit. It cannot be determined, actually, whether it was still a part of, or already separated from, the payload. Further, no valid tracking data on Polyot 2 was obtained for a period of about 5 hours and 33 minutes after Shemya tracked it during Zero Orbit. Thus, it is entirely possible that Polyot 2 executed more than the two maneuvers hypothesized above.

Success in maneuvering Polyot 2 would be a significant step forward for the Soviet space program, for it would indicate that the Soviets are now capable of multiple stops and restarts of engines in space. Several of the Soviets' space probes have apparently aborted in the past because of failure of upper-stage engines to ignite, or to ignite properly, in space. Multiple engine stops and restarts are necessary for satellite interception, for rendezvous, and for the construction of space stations -- all of which appear to be on the Soviet space program.

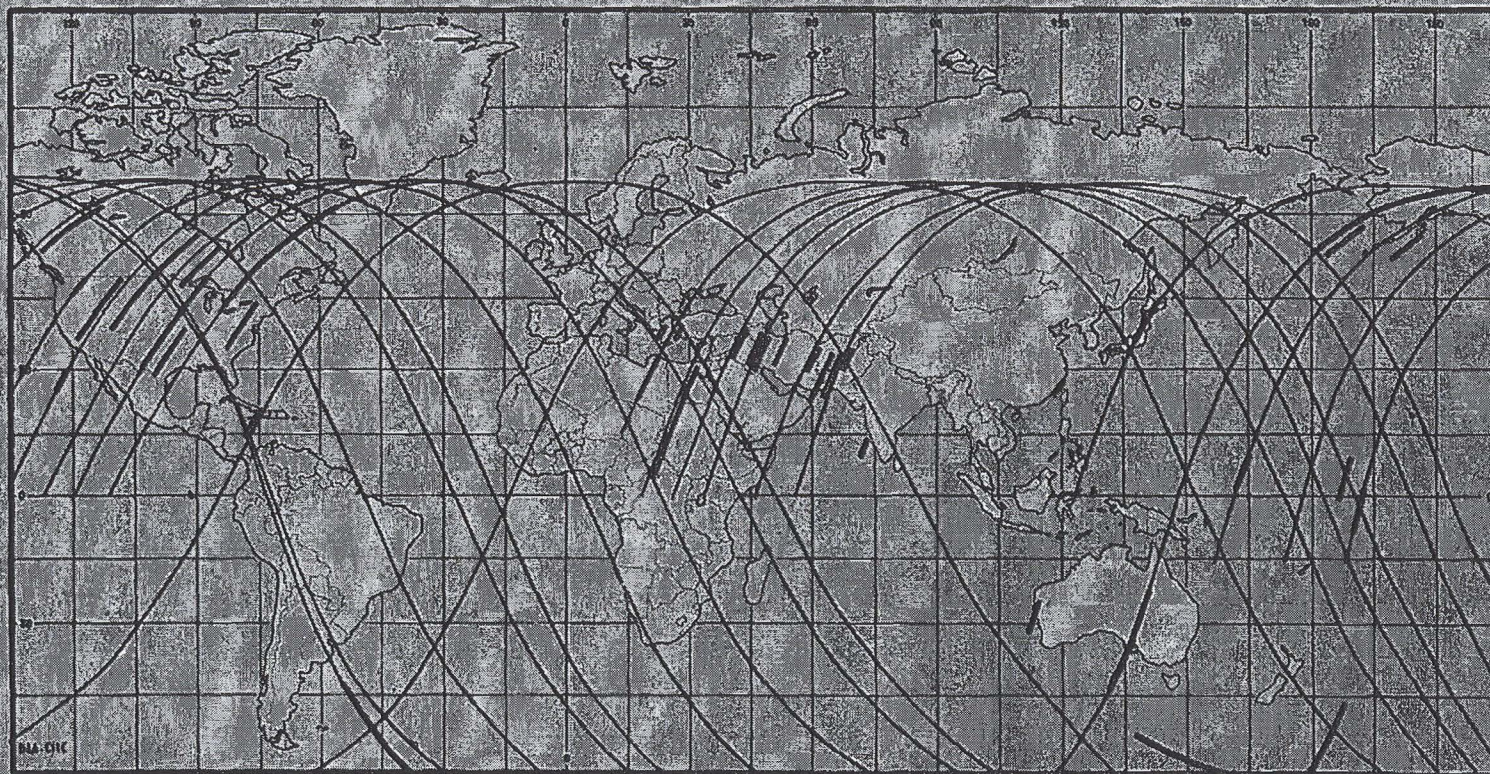
True maneuverability in space calls for engines that can be throttled in space as well as stopped and restarted. It is believed that Polyot 2's engines were designed for restart but not for throttling, although it is known that the engines of the SS-6 ICBM, which the Soviets have used for most of their space launches, uses thrust modulation in connection with guidance.

More data is needed before current Soviet capabilities for maneuvering in space can be evaluated with confidence and before a definite determination can be made as to the extent of maneuvers executed by Polyot 2.

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World Areas of Possible Photoreconnaissance by Cosmos 20



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EXCEPT UK, CANADA,
AUSTRALIA AND NEW
ZEALAND

Heavier lines on orbital traces show location of vehicle when payload was active. Photo coverage, if any, may have extended 150-160 n. m. to either side of center of trace.

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Life Expectancies of Soviet Space Vehicles -- Estimated

Vehicles in Earth Orbit

<u>International Designation</u>	<u>Common Name</u>	<u>Launch Date</u>	<u>Life Expectancy</u>
1962 B. Theta 1	Cosmos 11	22 Oct 62	23 May 64
1963-17A	Cosmos 17	22 May 63	May 65
1963-43A	Polyot 1	1 Nov 63	Over 30 years
1964-6A	Electron 1	30 Jan 64	Over 30 years
1964-6B	Electron 2	30 Jan 64	Over 30 years
1964-10A	Cosmos 25	27 Feb 64	Dec 64
1964-13A	Cosmos 26	18 Mar 64	Nov 64
1964-19B	Polyot 2	12 Apr 64	Over 3 years

Vehicles in Heliocentric (Sun) Orbit

1959 Mu 1	Lunik 1	2 Jan 59	Indefinite
1961 Gamma	Venik	12 Feb 61	Indefinite
1962 Beta Nu 3	Mars 1	1 Nov 62	Indefinite
1964-16	Zond 1	2 Apr 64	Indefinite

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Vehicles in Barycentric (Earth-Moon) Orbit

1963-8B	Lunik 4	2 Apr 63	Not Computed
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Vehicles Resting on Surface of the Moon

1959 Xi 1	Lunik 2	12 Sep 59	Indefinite
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